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THE EFFECTS OF HERBICIDES IN SOUTH VIETNAM

PART B. WORKING PAPERS: ESTIMATING THE HIGHLANDER
POPULATION AFFECTED BY HERBICIDES

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL

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Estimating the Highlander Population Affected by Herbicides

JOSEPH M. CARRIER^a

The following report sets forth some of the basic problems associated with a determination of the number of Highlanders likely to have been affected by the use of herbicides in South Vietnam (SVN). A general belief exists that proportionately more Highlanders were affected by herbicides than were ethnic Vietnamese. This discussion is presented with the hope that it can provide some background material useful for a more detailed investigation.

POPULATION ESTIMATES

The Highlanders of SVN, ethnically neither Vietnamese nor Cham, live in 26 of the 44 provinces currently making up the Republic of Vietnam (RVN). According to Hickey (1967), no complete census of this population has ever been made. Population estimates have varied considerably over time, the number ranging from a low of about 460,000 to a high of a little over one million. The official RVN estimates, presented in their Statistical Yearbook, have always been on the low side of the range, but they have been increased considerably over the past few years: from 464,354 in 1968 to 599,233 in 1970, and then 679,604 in 1971. In 1965 the RVN Special Commission for Highland Affairs had already made an estimate of 642,855, and a compilation of unofficial sources (Summer Institute of Linguistics, Hickey, missionaries, etc., as cited in Hickey 1967) had estimated the

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population at 927,000. A tabulation of estimates presented by ethnic group in a review study of Highlanders made by American University for the U.S. Army (Department of the Army 1966) gives a population ranging from 716,876 to 1,105,000.

DISTRIBUTION OF POPULATION

Although Highlanders inhabit 26 of the 44 provinces of SVN, a little over two-thirds were estimated by the RVN in 1970 to be concentrated in the seven central highland provinces of Darlac, Pleiku, Kontum, Tuyen-Duc, Phu-Bon, Lam-Dong, and Quang-Duc. The addition of Highlanders living in parts of the provinces of Long-Khanh, Quang-Ngai, Binh-Long, Phuoc-Long, and Binh-Thuan brings the cumulative estimated number of Highlander inhabitants in 12 provinces up to about 86 percent of the total (see Figure 1 and Table I).

Inhabitants of the province capitals excluded, Highlanders make up close to two-thirds of the rural population in the 12 provinces named above; ethnic Vietnamese make up the remaining one-third. Phu-Bon and Kontum Provinces have the fewest ethnic Vietnamese, only 9 and 15 percent, respectively; Long-Khanh, Lam-Dong, Binh-Long, and Tuyen-Duc have the most, with ethnic Vietnamese accounting for around half of the provinces' essentially rural population.

Based on RVN 1970 population estimates, Highlanders account for 3.5 percent of the total population in SVN. In the above-named 12 provinces, they make up about 3 percent of the total. If the higher estimate of a little over one million Highlanders were accepted, they would make up a little over 6 percent of the total.



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Table I.

Population distribution in major Highlander provinces: 1970.

Province	Estimated Number ^a		Percent Vietnamese	Province Total ^c	Refugees Resettled as of 12-31-70
	Highlanders	Vietnamese ^b			
Darlac	100,920	66,319	39.7	167,239	82,119
Pleiku	90,092	28,537	24.1	118,629	58,477
Kontum	61,244	11,356	15.6	72,600	51,474
Tuyen-Duc	53,614	45,310	46.3	114,274	11,671
Phu-Bon	48,058	4,578	8.6	52,886	74,841
Long-Khanh	35,915	40,421 ^d	53.0	131,319	65,412
Lam-Dong	32,587	37,072	53.2	69,659	19,523
Quang-Ngai	22,239	21,770 ^e	49.5	538,745	232,587
Binh-Long	20,248	23,970 ^f	54.2	55,861	20,758
Phuoc-Long	19,490	5,764	22.8	25,254	44,051
Quang-Duc	18,147	8,780	32.6	26,927	22,647
Binh-Thuan	14,025	3,961 ^g	22.0	188,388	16,082
Total	516,879 ^h	298,788	36.6	1,561,781	

^aFrom Tables 314 and 316, Vietnam Statistical Yearbook: 1970.^bProvince total less province capital and Highlanders. In certain provinces as listed below, only ethnic Vietnamese found in districts containing Highlanders included.^cProvince total less province capital population.^dDinh-Quan and Kiem-Tan Districts only.^eBato, Minh-Long, Son-Ha and Tra-Bong Districts only.^fAn-Loc and Loc-Ninh Districts only.^gPhan-Ly-Cham District only. Chams included with Vietnamese.^hEighty-six percent of total estimated Highlander population of 599,233.

HERBICIDE MISSIONS

The number of gallons of Agents Orange, White, and Blue sprayed in the 12 provinces from 1965 to 1970 are shown in Table II; the location of the spray runs in Figure 2. As can be seen from the figure and table, Phuoc-Long, Long-Khanh, and Kontum were the Highlander provinces hardest hit in terms of the total amount sprayed; Tuyen-Duc, Phu-Bon, and Lam-Dong were the least sprayed.

It is of interest to note that the three most heavily sprayed provinces account for 72 percent of the herbicides sprayed in the 12 provinces but only 22.5 percent of the estimated Highlander population. The three least sprayed provinces, on the other hand, account for only 2 percent of the herbicides sprayed but for 26 percent of the population. Moreover, as shown in Table II, the six least sprayed provinces account for only 12 percent of the herbicides but for over half (52%) of the Highlander population.

THE NUMBER OF SPRAYED HIGHLANDERS

A reasonable estimate of the number of Highlanders directly affected by herbicides would require as a minimum the following data inputs for each province: (1) the type and amount of herbicides sprayed and their spatial and temporal distribution, and (2) the location of the Highlanders and their swiddens during the spray period.

As shown in Figure 2, the spray missions were not evenly targeted over each of the 12 Highlander provinces or districts outlined. The most devastating spraying appears to have taken place in the predominantly

Table II.

Total gallons of herbicides sprayed: 1965 to 1970 (by province).

Province	Herbicides sprayed			Total	Estimated Highlander population
	Orange	White	Blue		
Phuoc-Long	1,612,685	1,098,450	44,500	2,755,635	19,490
Long-Khenh	994,240	627,370	16,290	1,637,900	35,915
Kontum	705,443	125,340	141,380	972,163	61,244
Pleiku	213,585	194,135	14,400	422,130	90,092
Quang-Duc	270,705	136,850	12,500	420,055	18,147
Quang-Dai	248,515	37,650	89,957	376,122	22,239
Binh-Long	144,240	217,235	0	361,475	20,248
Dariac	137,100	37,500	23,080	197,680	100,920
Binh-Thuan	125,565	46,040	0	171,605	14,025
Lam-Dong	38,900	2,890	55,185	96,975	32,587
Phu-Bon	12,300	19,800	10,900	43,000	48,358
Tuyen-Duc	0	0	4,540	4,540	53,614
Total	4,503,278	2,543,260	412,732	7,459,270 ^a	516,879 ^b

^aThis 12-province total represents 42.2 percent of all herbicides sprayed in South Vietnam; 39.8% of the Orange, 48.5% of the White, and 46.5% of the Blue.

^bThis total represents 86 percent of the Highlander population estimated by the RVN in 1970.

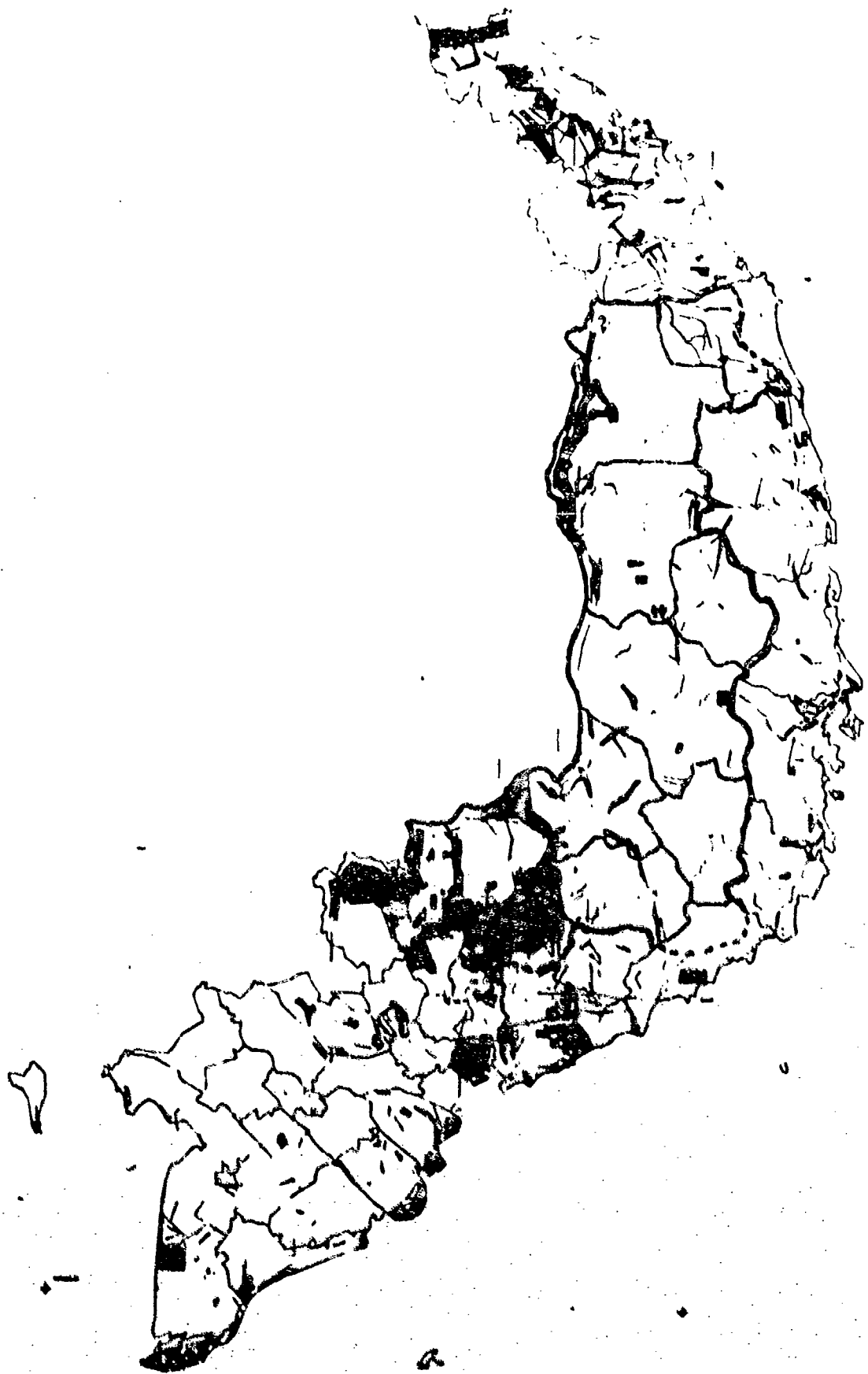


FIG. 2. All defoliation missions in South Vietnam.

Highlander districts of Bo-Duc and Don-Luan in Phuoc-Long Province and Kiem-Tan and Dinh-Quan in Long-Khanh Province, where close to half of these districts appear to have been sprayed. If one-half of the Highlanders living in these districts were sprayed, they alone would amount to about 4 percent of the RVN estimate of Highlanders in 1970.

RVN data on war refugees (see Table I) for the years of most intensive spraying, 1967 to 1970, show that a large percentage of the inhabitants in the relevant 12 provinces had been resettled by the end of 1970. Since some inhabitants were resettled more than once, the total number shown does not necessarily reflect the percentage of the population that was resettled over the 1967 to 1970 time period. However, population movements during the period of most intensive spraying suggest that great care must be taken in locating Highlanders assumed to have been living in herbicide target areas.

Table III presents the number of gallons of herbicides expended per inhabitant and per square kilometer in each of the major highland provinces. Since at the time of spraying neither the herbicides nor the inhabitants were uniformly distributed in each province, the figures only provide some notion of the relative impact of herbicides on Highlanders by province of residence.

A CLOSE LOOK AT TWO PROVINCES: PLEIKU AND KONTUM

A comparison of CORDS and RVN populations estimates for Pleiku and Kontum for 1967, 1969, and 1970 is presented in Table IV. The table shows that for 1967, CORDS' population estimates in both provinces were substantially lower than that of the RVN; 19 percent less in Pleiku, 16 percent

Table III.

Ranking of Highlander provinces by herbicides expended.^a

Province	Gallons/ rural inhab.	Rank	Gal/km ²	Rank	Area (km ²)
Phuoc-Long	109.11	1	520	1	5,299
Quang-Duc	15.60	2	50	5	5,958
Kontum	13.39	3	95	4	10,181
Long-Khanh	12.47	4	167	2	4,464
Binh-Long	6.47	5	154	3	2,343
Pleiku	3.56	6	50	7	8,444
Lam-Dong	1.39	7	18	10	5,504
Darlac	1.18	8	19	9	10,552
Binh-Thuan	0.91	9	40	8	4,241
Phu-Bon	0.81	10	9	11	4,785
Quang-Ngai	0.70	11	66	6	5,718
Tuyen-Duc	0.04	12	1	12	4,988

^a Gallons of Agents Orange, White, and Blue sprayed from 1965-1970.^b Province population less province capital's population.

Table IV.

Comparison of CORDS and RVN population estimates for
Pleiku and Kontum Provinces^a.

Year	Pleiku Province				Kontum Province			
	(1)	(2)	Difference		(1)	(2)	Difference	
	RVN	CORDS	(1)&(2)	(2) ^b	RVN	CORDS	(1)&(2)	(2) ^b
1967	192,682	156,011	-36,671		104,241	87,472	-16,769	
1969	194,853	191,922	- 2,931	+23%	108,947	110,138	+ 1,191	+26%
1970	186,522	234,527	+48,005	+22%	106,154	105,698	- 465	-04%

^aSource of population estimates: (1) RVN Statistical Yearbook, National Institute of Statistics, Saigon.

^bPercentage difference between (2) Computer printout of population estimates made by CORDS for Hamlet Evaluation Survey (HES) supplied by DOD.

Table V.

Comparison of number of refugees with estimated population
in Pleiku and Kontum Provinces^a.

Year	Pleiku Province			Kontum Province		
	Refugees	CORDS Pop.	estimate	Refugees	CORDS Pop.	estimate
	Temporary ^b	Resettled ^c		Temporary ^b	Resettled ^c	
1967	5,218	-	156,011	20,590	-	87,472
1968	11,170	7,368	-	19,342	5,459	-
1969	-	20,014	191,922	965	24,994	110,138
1970	11,653	4,707	234,527	-	1,831	105,689

^aSource of number of "war refugees": RVN Ministry of Social Welfare as reported in Table 324, RVN Statistical Yearbook.

^bNumber of persons (in camp and out camp) who have begun to receive resettlement assistance but have not been fully reestablished.

^cNumber of temporary refugees who have been resettled with government assistance or have returned to their own villages.

Note: The total number of refugees resettled in Pleiku and Kontum Provinces as of December 31, 1970 according to the Ministry of Social Welfare was as follows: Pleiku- 58,477; Kontum- 51,474.

less in Kontum. Population estimates of the two provinces were roughly the same in 1969; they were the same for Kontum in 1970, but differed for Pleiku where CORDS estimated the population 25 percent higher. Table IV also shows that CORDS population estimates in Pleiku were substantially increased between 1967 and 1969, and 1969 and 1970. This was also true for Kontum between 1967 and 1969, but a small decrease is shown between 1969 and 1970.

A comparison of the CORDS population estimates for 1967, 1969, and 1970 at the village level in the Thanh-An District of Pleiku and the Dakto District of Kontum suggests that increases in the estimated population over time were related to the location of additional Highlander settlements (see Figure 1). The comparison further suggests that CORDS personnel were also picking up the movement of Highlander refugees into US/RVN-controlled territory. There is no way of knowing, however, how many Highlanders living in NLF/NVA-controlled territory were not reported for the 1967-1970 time period. At the province level, Table V compares the number of "war refugees" reported by the RVN with the CORDS population estimates for Pleiku and Kontum.

THE LOCATION PROBLEM

In addition to the fact that no complete census of the Highlander population has ever been made, there is no reliable information on the location and names of perhaps a majority of Highlander settlements. Part of this lack of information is related to the remote areas in which many of the Highlanders live. Part is related to the problem of phonetically transcribing the names of villages elicited verbally from informants.

The names of villages shown on maps have employed several different phonetic transcription systems. One cannot be absolutely sure, therefore, that a given map name and elicited name--even if quite similar--represent the same village site. Still another part is related to the fact that the elicited names, transcription problems aside, may not pinpoint the exact site of a given settlement. The principal reason for this is the historical fact that both the French and ethnic Vietnamese used different naming systems in establishing administrative control over the people of the highlands. The French divided the districts they created into several cantons. Each canton enclosed a number of villages and was named after one of the important villages enclosed. The ethnic Vietnamese then superimposed their system, which subdivided the cantons. The Vietnamese conceptualize a "village" as covering a relatively large geographic area containing three or more settlements. Cantons were thus divided into Vietnamese-defined villages, each of which enclosed several highland settlements. The Vietnamese-created village was named after one of the settlements enclosed. The outcome of all these administrative subdivisions is that a name elicited from an informant may be the traditional name of the settlement and/or the subunit name imposed either by the French or ethnic Vietnamese.

OVERVIEW

The percentage of Highlanders directly exposed to herbicides cannot be reliably estimated with the available data. A correlation of herbicide spray runs with CORDS population estimates at the village level at the time of spraying for the major highland provinces would probably

understate the number of exposed inhabitants. The two major reasons for this are as follows. First, baseline data on the location and population of Highlander settlements and associated swiddens are not available, since no complete census has ever been made in the highlands of SVN. Second, the range of the estimated number of Highlanders living in SVN is large--from 460,000 to one million. Although official U.S./RVN population estimates have been increased over time, they are still on the low side of the estimated range. Furthermore, there is no way of knowing how many Highlanders were living in herbicide target areas since they were all located in territory essentially controlled by the NLF/NVA.

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